

Amendment and Response Under 37 C.F.R. §1.116 - Expedited Examining Procedure

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Serial No.: 09/651,702

Confirmation No.: 2471

Filed: August 30, 2000

For: SUPERCRITICAL COMPOSITIONS FOR REMOVAL OF ORGANIC MATERIAL AND METHODS OF USING SAME

Remarks

The Office Action mailed September 9, 2003 has been received and reviewed. Claims 19, 22-24, 45, 49, and 52 having been canceled, claims 20 and 46 having been amended, and claims 55-59 having been added, the pending claims are claims 20-21, 23-25, 27-29, 31-32, 43-44, 46-48, 50-51, and 53-59.

Claim 20 has been rewritten in independent form by incorporating the language of claim 19, now canceled. Claim 46 has been amended to depend from claim 20.

New dependent claims 55-59 are supported by the specification at, for example, page 6, line 22 to page 7, line 13.

Reconsideration and withdrawal of the rejections are respectfully requested.

Rejection under 35 U.S.C. §102

The Examiner rejected claims 19, 22, 46, 49, and 52 under 35 U.S.C. §102 as being anticipated by U.S. Pat. No. 5,389,263 (Gallagher et al.). Claims 19, 22, 49, and 52 having been canceled, and claim 46 have been amended to depend from claim 20, Applicant respectfully submits that the rejection under 35 U.S.C. §102 has been rendered moot.

Applicant respectfully requests that the Examiner reconsider and withdraw the rejection under 35 U.S.C. §102.

Rejection under 35 U.S.C. §103

The Examiner rejected claims 20-21, 23-25, 27-29, 31-32, 43-45, 47-48, 50-51, and 53-54 under 35 U.S.C. §103 as being unpatentable over U.S. Pat. No. 5,389,263 (Gallagher et al.). Claims 23-24 and 45 have been canceled. Applicant respectfully traverses the rejection.

"To establish a *prima facie* case of obviousness . . . there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. . . . Finally, the prior art reference (or references when combined) must teach or

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suggest all the claim limitations" M.P.E.P. §706.02(j). Applicants respectfully submit that the Examiner has failed to establish a *prima facie* case of obviousness.

Gallagher et al. disclose "a process for separating mixtures of crystalline solids which comprises: . . . [d]issolving the solid mixture to be separated in a liquid solvent . . . [and] [a]dding to the solution of liquid solvent plus dissolved solid, a volume of gas or supercritical fluid anti-solvent sufficient for inducing precipitation of only one component of the mixture" (column 3, lines 39-46, emphasis added). Gallagher et al. disclose that anti-solvents may be "selected from the group consisting of methane, ethane, ethylene, propane, butane, nitrous oxide, nitrogen, dimethyl ether, isobutanes, propylene, chlorotrifluoromethane, dichlorodifluoromethane, chlorodifluoroethane, sulfur hexafluoride, hexafluoroethane, carbon tetrafluoride, and mixtures thereof" (e.g., claims 19, 28, 31, and 35 at columns 8-10). Gallagher et al. further disclose that the anti-solvent may be carbon dioxide (CO₂) (e.g., claim 18 at column 8) or sulfur trioxide (SO₃) (e.g., claims 20, 29, and 33 at columns 8-10). Finally, Gallagher et al. disclose a process using a "second anti-solvent [that] is different from the anti-solvent" (e.g., claim 36 at column 10).

Thus, Gallagher et al. specifically disclose the 18 anti-solvents listed herein above including carbon dioxide (CO₂), sulfur trioxide (SO₃), nitrous oxide (N₂O), and nitrogen (N₂). Gallagher et al. also disclose that mixtures of anti-solvents may be used.

Although Gallagher et al. disclose that the anti-solvent may be sulfur trioxide (SO₃) or nitrous oxide (i.e., a compound that might be considered an oxidizer), they fail to specifically disclose the combination of sulfur trioxide (SO₃) in a supercritical state with an oxidizer (e.g., present independent claims 20, 25, 50, and 53). Moreover, Gallagher et al. provide no guidance for one of skill in the art to select the single combination (e.g., present independent claim 20) of sulfur trioxide (SO₃) and nitrous oxide (N₂O) from the 153 possible combinations of two different anti-solvents (18 x 17 / 2) disclosed by Gallagher et al.

Further, although Gallagher et al. disclose that the anti-solvent may be sulfur trioxide (SO₃), carbon dioxide (CO₂), nitrous oxide (N₂O), or nitrogen (N₂), they fail to

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specifically disclose the combination of sulfur trioxide (SO₃) in a supercritical state with a first component selected from the group consisting of carbon dioxide (CO₂), ammonia (NH₃), H₂O, nitrous oxide (N₂O), carbon monoxide (CO), nitrogen (N₂), helium (He), neon (Ne), argon (Ar), krypton (Kr), and xenon (Xe), and a second component selected from the group consisting of sulfur dioxide (SO₂), nitrous oxide (N₂O), NO, NO₂, ozone (O₃), hydrogen peroxide (H₂O₂), F₂, Cl₂, Br₂, and oxygen (O₂) (e.g., independent claims 27, 51, and 54). Moreover, Gallagher et al. provide no guidance for one of skill in the art to select either of the two combinations (e.g., present independent claims 27, 51, and 54) of anti-solvents (i.e., sulfur trioxide with nitrous oxide and either carbon dioxide or nitrogen) from the 816 possible combinations of three different anti-solvents ((18 x 17 x 16) / (3 x 2)) disclosed by Gallagher et al.

Finally, Gallagher et al. fail to disclose or suggest a composition that is an organic material removal composition (e.g., present independent claims 20, 25, and 27), a composition for removing exposed organic material from an object (e.g., present independent claims 50-51), or a composition for removing exposed organic material from a substrate assembly (e.g., present independent claims 53-54). Moreover, the presently claimed combinations are advantageous for removing a wide variety of organic materials as recited in the specification.

A wide variety of organic materials can be effectively removed using the compositions and methods of the present invention. For example, resist material, photoresist residue, organic residues, carbon-fluorine containing polymers such as those resulting from oxide etching processes or plasma etch processes, and organic impurities from other processes, may be removed according to the present invention. Such compositions and methods are particularly beneficial for removing ion implanted resist, UV hardened resist, X-ray hardened resist and resist in submicrometer grooves or crevices. (Specification at page 10, lines 16-23).

Thus, Applicant respectfully submits that the present claims are patentable over Gallagher et al.

Furthermore, in preferred embodiments of the present invention, claims 46-48 recite that the composition further comprises "a component selected from the group consisting of

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hydrogen chloride, hydrogen bromide, hydrogen fluoride, ammonium fluoride, tetramethylammonium fluoride, tetramethylammonium hydroxide, beta-diketones, fluorinated-diketones, organic acids, and combinations thereof." Gallagher et al. fail to specifically disclose or suggest an organic material removal composition that includes *a component selected from the group consisting of hydrogen chloride, hydrogen bromide, hydrogen fluoride, ammonium fluoride, tetramethylammonium fluoride, tetramethylammonium hydroxide, beta-diketones, fluorinated-diketones, organic acids, and combinations thereof*. Applicant respectfully submits that Gallagher et al. fail to disclose or suggest all the claim language of present claims 46-48.

Based on the remarks presented herein above, Applicants respectfully submit that the Examiner has failed to establish a *prima facie* case of obviousness. Applicants respectfully request that the Examiner reconsider and withdraw the rejection under 35 U.S.C. §103.

New Claims

New dependent claims 55-59 depend from claims 20, 25, 27, 50, and 51, respectively. Applicant respectfully submits that new claims 55-59 are patentable for at least the reasons recited for the patentability of claims 20, 25, 27, 50, and 51. Further, Applicant respectfully submits that Gallagher et al. fail to disclose or suggest a substrate assembly in contact with the organic material removal composition (e.g., claims 55-57) or the composition for removing exposed organic material from an object (e.g., claim 58-59).

Applicant respectfully requests that new dependent claims 55-59 be entered, considered, and passed on to allowance.

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Summary

It is respectfully submitted that all the pending claims are in condition for allowance and notification to that effect is respectfully requested. The Examiner is invited to contact Applicant's Representatives, at the below-listed telephone number, if it is believed that prosecution of this application may be assisted thereby.

Respectfully submitted for
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CERTIFICATE UNDER 37 CFR §1.8:

The undersigned hereby certifies that the Transmittal Letter and the paper(s), as described hereinabove, are being transmitted by facsimile in accordance with 37 CFR §1.6(d) to the Patent and Trademark Office, addressed to Assistant Commissioner for Patents, Mail Stop AF, P.O. Box 1450, Alexandria, VA 22313-1450, on this 4 day of November, 2003, at 11:45 AM (Central Time).

By: [Signature]
Name: SARA E. OLSON